NEAR EAST UNIVERSITY–COMMON COURSES COORDINATION UNIT

Course Information Sheet & Course Outline

2021-2022 Fall Semester

Course Code	Course Name	Credit	ECTS
MTH102	**Calculus II**	3	

Pre-requisite: Calculus I (MTH101)

Language: English	Course Type: Compulsory	Year: 2021-2022	Semester:Fall

Weekly Hours	Class Hours	Laboratory	Practicum	Learning Sessions			
				PS	C	R	T
	3	-	-				

Learning Outcomes	After the completion of this course, the student will be able to - Use the concepts of definite integrals to solve problems involving area, volume, work, and other physical applications. - Calculate the extreme points and saddle point of two variables functions - Compute the area and volume in the aid of iterated integrals - Understand the vector fields and flux - Learn the application of calculus in engineering for conservative fields
Course Description	Power series, Taylor Polynomials, Taylor Series, Maclaurin series, Binomial series, Lines and planes, Functions of several variables, Limits and Continuity, Partial Differentiation, Chain Rule, Tangent plane, Critical points, Global and Local Extrema, Directional Derivatives, Gradient, Divergence and Curl, Multiple integrals with applications, Triple integrals with applications, Triple integrals in Cylindrical and Spherical coordinates, Line-, Surface- and Volume Integrals, Independence of path, Green's Theorem, Conservative Vector Fields, Divergence Theorem, Stokes Theorem.
Course Objectives	Calculus was first invented to meet the mathematical needs of scientists of the sixteenth and seventeenth centuries, needs that mainly mechanical in nature. Nowadays it is a tool used almost everywhere in the modern world to describe change and motion. Its use is widespread in science, engineering, medicine, business, industry, and many other fields. Calculus also provides important tools in understanding functions and has led to the development of new areas of mathematics including real and complex analysis, topology, and non-Euclidean geometry.

Textbooks and/or References		
	1	Thomas, G. B. (1974). Calculus and analytic geometry.
	2	Adams, R. A., & Essex, C. (1999). Calculus: a complete course (Vol. 4). Boston: Addison-Wesley.
	3	Leithold, L. (1990). The calculus of a single variable with analytic geometry. Harper & Row.
	4	Silverman, R. A. (2002). Modern calculus and analytic geometry. Courier Corporation.
	5	Edwards, C. H. (1990). Calculus and analytic geometry. Prentice Hall PTR.
	6	

Course Content	Series and discussion on convergences, introduction to analytic geometry, parameterization, line and plane in 3D, Partial derivatives and chain rule, Calculating the extrema points, Double and triple integrals, polar and cylindrical coordinates, flux, divergent, green theorem, Stokes theorem.
Methods and Techniques Used in the Course	Methods of Instruction/Course Format/Delivery: Methods employed will include Lecture/demonstration,discussion, problem solving, analysis, and reading assignments. Homework will be assigned. Faculty maychoose from, but are not limited to, the following methods of instruction: Lecture, Discussion, Internet, Video, Television, Demonstrations

WEEKLY OUTLINE

Week	Date	Topic	Activities	Reference
1		**Introduction to the Course**		
2		Sequences	Convergence of the sequences and properties of the sequences	
3		Series	Geometric series, convergent and divergent series, comparison test, root test, ratio test and examples	
4		Series	Power series, Interval of convergent,Brief explanation of Taylor series and applications.	
5		Analytic Geometry	Vector, Inner product, Cross product, Properties of vectors and their operations, line equations, Equation of plane and their properties, distance on 3D, function of two variables and their limits	
6		Partial derivatives	Partial derivatives and their properties, chain rule	
7		Maximum, minimum and saddle	Discussion on Jacobi, The critical points of two variable functions, saddle points.	
8		Parametrization	Parametrisation of line, circle, ellipsoid and related trigonometric terms, polar coordinate and Cylindrical	
9		Double integral	Meaning of double integral, limit of integrals with simple border, Finding the region and interchanging the limits of integration,	
10		triple integrals and surface area	meaning of triple integral, Cylindrical coordinate in integration and examples, surface area	
11		Line integral	Line integral, vector fields, line integral of vector fields	
12		Conservative vector field	conservative field and invariant path, Potential functions, physical work, fundamental theorem of line integrals	
13		Green Theorem	Finding potential function of conservative fields, Curl, divergent, vector forms of Green theorem	

14		Stokes Theorem	Curl, flux, integral on surface, Stokes Theorem	
15		Final Exam	**Final exam**	
16				

Attendance: Minimum 70 %

Assessment Breakdown		**Type**	**%**	**Reference/ Source**
	1	Midterm (1 assignment and 1 exam)	%40	Up to the end of week 6
	2	Final (1 exam)	%60	All materials
	3			
	4			

Learning Program

Educational Tool	**Amount**	**Student Work Load (Hours)**	**Educational Tool**	**Amount**	**Student Work Load(Hours)**
			Total		
		Recommended ECTS Credit (Total Hours / 30):		**/30 = ~**	